When Feeding Preemies

How much enteral feeding is enough?

The incompletely developed bodies of premature infants suffer from a variety of gastrointestinal complications that prevent doctors from feeding them in a normal fashion. To survive, they often have to depend on parenteral nutrition—that is, direct infusion of nutrients into the bloodstream that bypasses the intestinal tract.

Total parenteral nutrition (TPN) allows doctors to meet a premature infant's nutritional requirements for growth and development when the infant's size or condition makes enteral feeding—feeding by mouth—impossible.

Researchers at the ARS Children's Nutrition Research Center in Houston, Texas, led by Douglas G. Burrin, are trying to find out how much feeding by mouth is needed to stimulate and normalize preemies' intestinal growth. According to Burrin, use of TPN has drawbacks.

"One problem is that a lack of enteral feeding may lead to reduced growth and functional development of the intestinal tract. In addition, premature infants with short-bowel syndrome need enteral feeding for their intestines to properly adapt and grow," says Burrin.

Doctors think they have found a way to deal with these concerns by giving TPN-fed preemies small amounts of nutrition by mouth—referred to as minimal enteral feeding. This feeding method increases the infants' tolerance of full enteral feedings and speeds the maturation of gastrointestinal motility, which is the ability of the intestines to move or contract.

Research suggests that certain nutrients actually stimulate intestinal growth and maintain the mucosal lining in both adult and neonatal animals. "What is not known is what the optimal levels or composition of nutrients are for normal gastrointestinal growth and function," says Burrin.

Researchers used neonatal piglets to quantify the minimal amounts of enteral nutrition necessary to stimulate and normalize growth of the small intestine. They found that at least 40 percent of nutrients by mouth were necessary to stimulate intestinal growth—and that 60 percent or more were needed to normalize it. Previously, 5 to 10 percent were thought to be sufficient.

Neonatal piglets were used in the study because of the similarities between their gastrointestinal development and function, body composition, and metabolism and those of human neonatal infants.

The researchers are using this approach to determine whether specific nutrients can be fed enterally to maximally stimulate intestinal growth and development. Researchers are also studying how specific nutrients stimulate the secretion of peptide hormones, which increase the intestinal absorption of nutrients.

The details of this study were recently published in the *American Journal of Clinical Nutrition.*—By **Jesús García,** ARS.

This research is part of Human Nutrition, an ARS National Program (#107) described on the World Wide Web at http://www.nps.ars.usda.gov.

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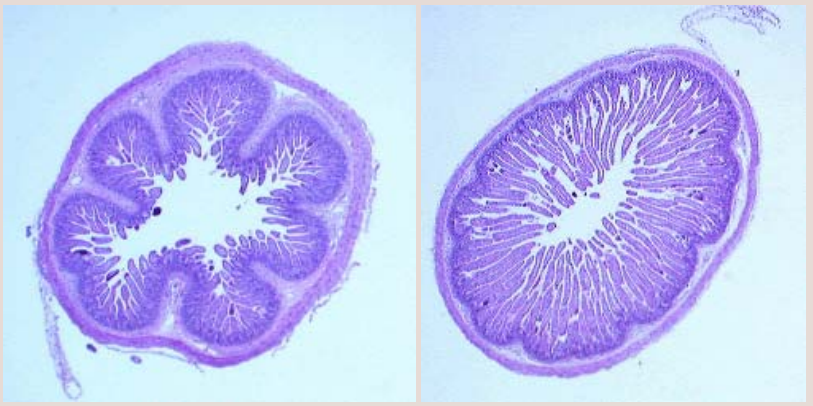

Left: Cross-section of an intestine of a 1-week-old piglet nourished with total parenteral nutrition (TPN). The TPN intestine is atrophied.

Right: Cross-section of a healthy, newborn piglet intestine.